Neuromyelitis optica spectrum disorders: symptomatic and rehabilitative therapy

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ABSTRACT

NMOSD's are a category of autoimmune inflammatory illnesses that predominantly affect the optic nerves, spinal cord, brainstem, and infrequently the cerebrum. NMOSD is distinguished by recurring episodes of visual, motor, and/or sensory impairment, which frequently culminate in severe neurological abnormalities. Although there has been substantial progress in relapse treatment and prevention in recent years, the residual impairment per attack remains high. Despite the fact that symptomatic and restorative research in NMOSD has been restricted, several treatment techniques can be deduced from published case series and information from the multiple sclerosis literature. We will explore established and new therapeutic approaches for symptomatic therapy and function restoration in NMOSD in this review. We highlight NMOSD-specific concerns and prospective future research fields.

Key Words: Sphincter dysfunction; Motor and visual impairment; Exhaustion; Sleep problems; Cognitive symptoms

OPINION

The article discusses pharmacologic, non-pharmacologic, and neuromodulatory therapies to neuropathic pain, tonic spasms, aberrant muscle tone, sphincter dysfunction, motor and visual impairment, exhaustion, sleep problems, and cognitive symptoms. Furthermore, we cover remyelinating drugs and mesenchymal stem cell transplantation in NMOSD briefly. Immunomodulating therapy for Neuromyelitis Optica Spectrum Disorders (NMOSD) relapse prevention have advanced considerably in recent years. The findings of three phase-3 clinical studies for Disease-Modifying Treatments (DMT) for NMOSD were released in 2019. In addition to the success made in relapse prevention with existing off-label medications, these emerging immunotherapies will very certainly enhance the overall prognosis of NMOSD. PLEX in conjunction with steroids has been shown in several retrospective or non-controlled trials to be effective in treating acute relapses and improving relapse outcomes in NMOSD patients. However, clinical relapses in NMOSD tend to be severe, and residual impairment remains high despite optimal preventative and recurrence therapy; hence, determining best practices for chronic care is an essential unmet need. Residual impairment and chronic symptoms have a significant impact n patient experience and Quality Of Life (QOL) in NMOSD patients, although they have received little attention. Based on existing research and clinical experience, the goal of this study is to discuss symptomatic and potentially restorative therapy in NMOSD.

o We also include knowledge gathered from Multiple Sclerosis (MS) and other illnesses affecting the spinal cord or optic nerves that might possibly be used to treat NMOSD patients. The emphasis of this analysis is not on transient symptoms that arise during a relapse and may disappear with acute immunotherapy (e.g., persistent hiccups/vomiting). Myelin Oligodendrocyte Glycoprotein Antibody Disease (MOGAD) and other related disorders are also not included. Pain is common in NMOSD patients, affecting more than 85% of them. The most common painful locations are around the chest and waist, down the full length of the legs, or in the back. Touch and temperature sensory loss with continuing discomfort, thermal hyperalgesia, mechanical allodynia, and/or paradoxical heat sensations are frequently shown by sensory testing. The position of the painful dermatomes on MRI frequently corresponds to the location of the spinal cord lesions; however, the degree of the pain does not correlate with illness duration, age, AQP4-IgG status, or the number of relapses. In individuals with NMOSD, spinal cord injuries primarily affect the cervical and thoracic segments, particularly the central canal and associated grey matter in the dorsal and ventral horns of the spinal column. Approximately 10–15% of all NMOSD patients have linear medullary lesions that begin in the fourth ventricle floor and spread into the mesencephalon along the periaqueductal grey matter. These lesions are thought to impact Central Nervous System (CNS) regions that are either close to or contain nociceptive or anti-nociceptive pathways, resulting in pain. According to a recent clinical-radiological cross-sectional investigation, the thoracic cord is engaged

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in pain production in NMOSD, whereas the ventral posterior thalamic nucleus is implicated in pain intensity control. In NMOSD, ladder dysfunction is a prevalent symptom that impairs QOL and increases morbidity. Lower urinary tract dysfunction was shown to be more severe in NMOSD patients than in MS patients in a cross-sectional study of 14 NMOSD patients and 34 MS patients. Furthermore, lower urinary tract dysfunction in patients with NMOSD was discovered to occur irrespective of any other neurologic abnormalities. In another cross-sectional study, 47 out of 60 NMOSD patients (78%) had bladder problems. The most annoying life consequences of these urine symptoms were fatigue (89%), travel limits (77%), the need to change undergarments often (74%), and limitations on conducting everyday tasks. According to one study, sexual dysfunction affects around 43% of sexually active females and 75% of sexually active males with NMOSD. Although no particular therapies for sexual dysfunction in NMOSD have been fully studied, phosphodiesterase inhibitors (e.g., sildenafil) may be useful in treating erectile dysfunction in men and sexual arousal disorder in women if not contraindicated for cardiac or vascular reasons. Fatigue is a typical symptom of NMOSD that affects roughly 70% of patients. It has been linked to low QOL, sadness, and pain. Despite research on this symptom in MS and NMOSD, the cause and origin of fatigue remain unknown. The definition of weariness differs from patient to patient. Physical exhaustion, mental fatigue, drowsiness, and depression are all examples of fatigue.

Physical exhaustion is assumed to be more common in NMOSD than mental fatigue, probably beca~use to NMOSD's greater cortical sparing campared to MS. Physical weariness has been related to certain brain and/or spinal anatomical sites, although investigations have not proven consistent. Mesenchymal Stem Cells (MSC) are pluripotent, non-hematopoietic cells that can be found in a variety of tissues but are most typically obtained from bone marrow and adipose tissue. MSC have been shown to exhibit immunomodulatory, reparative, and tissue-protective capabilities, as well as the ability to differentiate into many cell lineages and release a wide range of growth factors. Following collection, MSC are culture-expanded to boost cell population to desired dose and to verify cell type purity for therapeutic usage. MSC is frequently administered therapeutically by intravenous or intrathecal methods for systemic or CNS-specific administration, and via matrix embedding or injection for local requirements. Autologous MSC are frequently favored over allogeneic MSC because they reduce the risk of infection transmission and subsequent tissue rejection. The dose required for therapeutic success is frequently much above the quantity easily taken from a donor's bone marrow or adipose tissue, thus they are routinely culture-expanded before injection. This is not a concern if the MSC of a person suffering from a certain illness are unaffected by the disease condition. In one study, BM-MSC from NMOSD donors proliferated at a lower rate thanhealthy controls and had a greater rate of cell death.